

### **REMARKS**

The Examiner's Office Action dated April 6, 2009 has been received and carefully considered. In conformance with the applicable statutory requirements, this paper constitutes a complete reply and/or a bona fide attempt to advance the application to allowance. Reexamination and/or reconsideration of the application as amended are respectfully requested. Applicants hereby petition for any necessary extension of time and request that any necessary fee be charged to the credit card via EFS-Web.

Claims 1, 6-8, and 12-13 have been amended.

Claims 5, 11, and 17-19 have been withdrawn.

Claims 1-20 are pending in the application.

### **Summary of the Office Action**

Claims 1 and 8 were objected to because of minor informalities.

Claims 1-4, 6-10, 12-16, and 20 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by JP2001-276573 to Yajima (hereinafter "Yajima")

Claims 2-4, 9, 10, and 14-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yajima in view of JP2001-149451 to Hioki (hereinafter "Hioki").

Claims 6 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yajima in view of JP11-294138 to Gomyo (hereinafter "Gomyo").

Claims 8-10 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yajima, in view of Hioki, in further view of US 5,746,989 to Murachi (hereinafter "Murachi").

Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yajima, in view of Hioki, in further view of Murachi, and in further view of Gomyo.

### **Claim Objections**

Claims 1 and 8 have been amended to recite "a pair of a porous corrugated plate and a porous flat plate" on lines 3 and 4 in both claims. Therefore, appropriate correction has been made.

Accordingly, it is submitted the objection to claims 1 and 8 be withdrawn.

#### §112 Claim Rejections

Claim 1 now recites "a filter comprising a molding formed by stacking up pairs of a porous corrugated plate and a porous flat plate such that the ridge lines of the porous corrugated plates alternately cross perpendicularly, and by sealing either one side surface or two mutually-adjointing surfaces of the molding ..."

"the catalyst is an oxidizing catalyst".

Support for the amendment can be found in the specification on page 3, paragraphs 40 and 41. Moreover, there is sufficient antecedent basis for the limitation "oxidizing catalyst" in claims 3, 4, and 16.

Accordingly, reconsideration and withdrawal of the rejection of claim 1 along with claims 2-4, 6, 7, 14-16 dependent therefrom is respectfully requested under 35 U.S.C. §112.

Claim 8 now recites "and by sealing either one side surface or two mutually adjoining surfaces of the molding that are corrugated plate ridge lines..."

"...wherein an exhaust purifying catalyst is an oxidizing catalyst that oxidizes nitrogen monoxide and is supported on both surfaces of the porous corrugated plate which forms the exhaust gas in-flow passage, and

on one surface of the porous flat plate which is in contact with the porous corrugated plate, which forms the exhaust gas in-flow passage, and said oxidizing catalyst is supported on neither both surfaces of the porous corrugated plate nor one surface of the porous flat plate which is in contact with the porous corrugated plate, to form the exhaust gas out-flow passage."

Support for the amendment to claim 8 can be found in the specification on page 4, paragraph 49.

Accordingly, reconsideration and withdrawal of the rejection of claim 8 along with claims 9, 10, 12, 13, and 20 dependent therefrom is respectfully requested under 35 U.S.C. §112.

§ 102/103 Claim Rejections

Claim 1 now recites a filter for purifying an exhaust gas containing particulate matter and nitrogen monoxide. The molding is formed by stacking up pairs of a porous corrugated plate and a porous flat plate such that the ridge lines of the porous corrugated plates alternately cross perpendicularly. The filter further includes either a sealed one side surface or two mutually-adjointing surfaces of the molding perpendicularly crossing said porous corrugated plate ridge lines so that exhaust gas in-flow passages and exhaust gas out-flow passages are respectively formed between the porous corrugated plates via the porous flat plates. The filter further includes an exhaust gas purifying catalyst is supported on the porous corrugated plate and the porous flat plate to form the exhaust gas in-flow passages. The catalyst is an oxidizing catalyst which oxidizes monoxide and in exhaust gas to nitrogen dioxide which oxidizes the particulate matter deposited on the porous flat plates to carbon dioxide and water.

Such a filter is not shown nor suggested by the reference of record.

There is no teaching or suggestion of how an oxidizing catalyst supported on a porous corrugated plate and a porous flat plate in an exhaust gas in-flow passage could achieve oxidizing nitrogen monoxide in the exhaust gas to nitrogen dioxide followed by oxidizing the particulate matter deposited on the porous flat plates to carbon dioxide and water as presently claimed.

Yajima discloses an exhaust gas purification catalyst equipment which performs air purification (Yajima, Field of the Invention). The Examiner points to claim 1, drawings 4-6 of Yajima as disclosing a particulate matter exhaust gas purifying filter with a pair of porous corrugated plates and a porous flat plate that supports an exhaust gas purifying catalyst. However,

"Drawing 3 of Yajima illustrates nitrogen oxide ( $\text{NO}_x$ ) reduction catalyst whose reactant gas R is a reducing agent. The  $\text{NO}_x$  catalyst support layer 3a is formed in the field which touches exhaust gas E of the catalyst carrier 3. The reducing agent property modification catalyst support layer 3b is formed in the field which touches a reducing agent R. Property modification of the reducing agent R of the reactant gas

passage 4 is carried out in the reducing agent property modification catalyst support layer 3b. It penetrates the catalyst carrier 3 in the direction of arrow X, by the NO<sub>x</sub> catalyst support layer 3a by the side of the exhaust gas passage 2, returns the exhaust gas E and purifies NO<sub>x</sub> (Yajima, paragraph 12 of the translation)."

Thus, Yajima does not appear to support oxidizing NO in the in-flow passage to NO<sub>2</sub> followed by oxidizing to carbon dioxide and water of the particulate matter deposited on the porous flat plates. Rather, it appears any catalyst oxidizing NO is in the direction of X or in the downstream side of the filter plates. Therefore, there is no teaching or suggestion of how an oxidizing catalyst supported on a porous corrugated plate and a porous flat plate in an exhaust gas in-flow passage could achieve oxidizing nitrogen monoxide in the exhaust gas to nitrogen dioxide followed by oxidizing the particulate matter deposited on the porous flat plates to carbon dioxide and water using the nitrogen oxide (NO<sub>x</sub>) reduction catalyst of Yajima.

Accordingly, it is submitted claim 1 along with claims 2-4, 6-7, 14-15, and 16 dependent therefrom, distinguish over the reference of record.

Claim 4 recites a filter *inter alia* wherein the oxidizing catalyst contains titanium oxide.

Such a filter is not shown nor suggested by Yajima in view of Hioki.

There is no suggestion or teaching of how an oxidizing catalyst containing titanium dioxide could oxidize nitrogen monoxide forming nitrogen dioxide in the gas in-flow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed.

Yajima discloses an exhaust gas purification catalyst equipment which performs air purification (Yajima, Field of the Invention). The Examiner on page 5 of the Office Action concedes Yajima does not explicitly disclose that the exhaust gas purifying catalyst is the oxidizing catalyst titanium oxide.

Hioki discloses "a photocatalyst member which has the air pure operation which was excellent in heat exchange nature, and was excellent in deodorization property, antibacterial properties, etc." (Field of the Invention of Hioki). The Examiner points to Drawing 1 and paragraph 13 of Hioki as disclosing a similarly designed exhaust gas purifying filter with the oxidizing catalyst titanium oxide. The oxidizing catalyst titanium

oxide is well suited for removal of deleterious material. However, Hioki discloses a photocatalyst member which supports a photocatalyst at the end of the aeration side of the heat exchange type breathability member (Hioki, paragraph 11). The photocatalyst of Hioki is a photoactive semiconductor which brings about a photocatalytic reaction, such as antibacterial properties, antiviral, mildewproofing, deodorization, and antifouling, by irradiating with excitation light (Hioki, paragraph 12). Furthermore, the general purpose titanium dioxide in which titanium oxide is used as a white pigment (Hioki, paragraph 13). Thus, Hioki does not appear to support oxidizing NO in the in-flow passage to NO<sub>2</sub> followed by oxidizing to carbon dioxide and water of the particulate matter deposited on the porous flat plates. Rather, it appears a photocatalyst member supports a photocatalyst at the end of the aeration side of the heat exchange. Therefore, there is no teaching or suggestion of how an oxidizing catalyst containing titanium dioxide supported on a porous corrugated plate and a porous flat plate in an exhaust gas in-flow passage could achieve oxidizing nitrogen monoxide in the exhaust gas to nitrogen dioxide followed by oxidizing the particulate matter deposited on the porous flat plates to carbon dioxide and water using the photocatalyst of Hioki.

Thus, it would not have been obvious to one skilled in the art to modify the filter of Yajima in view of Hioki for the purpose of increasing the filter's ability to remove deleterious material.

Accordingly, it is submitted claim 4 along with claim 19 dependent therefrom, distinguish over the references of record.

Claim 15 recites a filter *inter alia* wherein the oxidizing catalyst contains titanium oxide.

Such a filter is not shown nor suggested by Yajima in view of Hioki.

There is no suggestion or teaching of how an oxidizing catalyst containing titanium dioxide could oxidize nitrogen monoxide forming nitrogen dioxide in the gas in-flow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed.

For the reasons discussed above in claim 4, it is submitted claim 15 distinguishes over the references of record.

Claim 3 recites a filter *inter alia* wherein said oxidizing catalyst contains platinum.

Such a filter is not shown nor suggested by Yajima in view of Hioki.

There is no suggestion or teaching of how oxidizing catalyst containing platinum could oxidize nitrogen monoxide forming nitrogen dioxide in the gas in-flow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed.

The Examiner on page 5 of the Office Action concedes Yajima in view of Hioki does not expressly state the use of platinum as the oxidizing catalyst.

Furthermore, for the reasons discussed above in claim 4, it is submitted claim 3 along with claims 16 and 18 dependent therefrom, distinguish over the references of record.

Claim 14 recites a filter *inter alia* wherein said oxidizing catalyst contains platinum.

Such a filter is not shown nor suggested by Yajima in view of Hioki.

There is no suggestion or teaching of how oxidizing catalyst containing platinum could oxidize nitrogen monoxide forming nitrogen dioxide in the gas in-flow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed.

The Examiner on page 5 of the Office Action concedes Yajima in view of Hioki does not expressly state the use of platinum as the oxidizing catalyst.

Furthermore, for the reasons discussed above in claim 4, it is submitted claim 14 distinguishes over the references of record.

Claim 16 recites a filter *inter alia* wherein said oxidizing catalyst contains platinum.

Such a filter is not shown nor suggested by Yajima in view of Hioki.

There is no suggestion or teaching of how oxidizing catalyst containing platinum could oxidize nitrogen monoxide forming nitrogen dioxide in the gas in-flow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed.

The Examiner on page 5 of the Office Action concedes Yajima in view of Hioki does not expressly state the use of platinum as the oxidizing catalyst.

Furthermore, for the reasons discussed above in claim 4, it is submitted claim 16 distinguishes over the references of record.

Claim 6 now recites a filter *inter alia* that includes a means for introducing exhaust gas into the exhaust gas in-flow passage of the filter and a means for interrupting the passage of the gas discharged from the out-flow passage.

Such a filter is not shown nor suggested by Yajima in view of Gomyo.

There is no teaching or suggestion of how a means for introducing exhaust gas into the exhaust gas in-flow passage could achieve a means for interrupting the passage of the gas discharged from the out-flow passage.

Yajima discloses an exhaust gas purification catalyst equipment which performs air purification (Yajima, Field of the Invention). The Examiner concedes on page 6 of the Office Action Yajima does not explicitly disclose a means for introducing exhaust gas into the in-flow passage and a means for interrupting the passage of gas discharged from the out-flow side, where the means for interrupting has a structure having a switching function of permitting or interrupting the passage of the gas.

Gomyo discloses a channel diversion valve adopted as the exhaust-air-purification device and purifying facility of the diesel engine which burns the particulate which caught the particulate in exhaust gas by the trap, and caught it further using oxygen in exhaust gas (Field of the Invention of Gomyo). The Examiner points to paragraphs 6-8, 19, and Figures 4 and 5 as disclosing an exhaust gas filter having a means for interrupting the passage of gas discharged from the out-flow side as presently claimed. The Examiner further states Gomyo discloses that the use of this design increases efficiency of gas filtration. However, Gomyo discloses

"a means to change the exhaust gas purifying facility of this invention to two steps in the amount of exhaust gas introduction to a trap. While providing the 1<sup>st</sup> channel and the 2<sup>nd</sup> channel in the upper stream [of a trap], or lower stream side and arranging the channel diversion valve which has an orifice in the branching part of the 1<sup>st</sup> channel and the 2<sup>nd</sup> channel. The gate valve has been arranged to the 2<sup>nd</sup> channel, and while said channel diversion valve restricted passage of exhaust air of the 1<sup>st</sup> channel, it was made for exhaust air to flow into the 2<sup>nd</sup> channel at the time of particulate combustion" (Gomyo, paragraph 8).

Thus, there is no suggestion of a means for interrupting the passage of gas discharged from the out-flow side rather it appears as a means for restricting the amount of exhaust

gas introduction to a trap. Therefore, there is no teaching or suggestion of how a means for introducing exhaust gas into the exhaust gas in-flow passage could achieve a means for interrupting the passage of the gas discharged from the out-flow passage using the channel diversion valve of Gomyo.

Accordingly, it is submitted that claim 6 along with claim 7 dependent therefrom, distinguish over the references of record.

Claim 8 now recites a filter for purifying an exhaust gas containing particulate matter and nitrogen monoxide including having a molding. The molding is formed by stacking up pairs of a porous corrugated plate and a porous flat plate such that the ridge lines of the porous corrugated plates alternately cross perpendicularly. The filter includes either one side surface or two mutually-adjoining surfaces of the molding are sealed so that exhaust gas in-flow passages and an exhaust as out-flow passage are respectively formed between the porous corrugated plates through the porous flat plates. The filter further includes an oxidizing catalyst that oxidizes nitrogen monoxide is supported on both surfaces of the porous corrugated plate. On one surface of the porous flat plate which is in contact with the porous corrugated plate the exhaust gas in-flow passage is formed. The oxidizing catalyst is supported on neither both surfaces of the porous corrugated plate nor one surface of the porous flat plate in contact with the porous corrugated plate to form the exhaust gas out-flow passage. The catalyst oxidizes nitrogen monoxide in the exhaust gas to nitrogen dioxide. Then the particulate matter deposited on the porous flat plates is oxidized to carbon dioxide and water.

Such a filter is not shown nor disclose by Yajima in view of Hioki in further view of Murachi.

There is no teaching or suggestion of how a filter having an oxidation catalyst in an inflow side with no oxidation catalyst in the outflow side of the flow path could achieve oxidizing nitrogen monoxide in the exhaust gas to nitrogen dioxide which oxidizes the particulate matter deposited on the porous flat plate to carbon dioxide and water.

Yajima discloses an exhaust gas purification catalyst equipment which performs air purification (Yajima, Field of the Invention). Hioki discloses "a photocatalyst member which has the air pure operation which was excellent in heat exchange nature, and was



excellent in deodorization property, antibacterial properties, etc." (Field of the Invention of Hioki). The Examiner concedes on page 7 of the Office Action Yajima in view of Hioki does not explicitly disclose an oxidation catalyst in an inflow side with no oxidation catalyst in the outflow side of the flow path.

Murachi discloses a method for purifying the exhaust gas of a diesel engine which is capable of removing both carbon particles and nitrogen oxide contained in the exhaust gas (Field of the Invention of Murachi). The Examiner points to Figure 1, column 3, lines 35-42 of Murachi as disclosing an exhaust gas filter with an oxidation catalyst in the inflow side but not in the outflow side as presently claimed. The Examiner further states Murachi discloses that the oxidation catalyst is on the inflow side so that the nitrogen dioxide can be captured in the filter.

However, the Abstract of Murachi, et. al. discloses,

"the exhaust gas containing  $\text{NO}_2$  formed by oxidation of nitrogen monoxide is, then, fed to the diesel particulate filter (DPF), and  $\text{NO}_2$  is the exhaust gas reacts with the carbon particles trapped in the DPF. When the  $\text{NO}_2$  reacts with carbon particles, carbon particles are oxidized (burned) by  $\text{NO}_2$  and removed from DPF, and, at the same time,  $\text{NO}_2$  is reduced to NO by the carbon particles. The exhaust gas containing NO formed by the reaction between the carbon particles and  $\text{NO}_2$  is fed to an  $\text{NO}_x$  absorbent. In the  $\text{NO}_x$  absorbent, NO is absorbed by the  $\text{NO}_x$  absorbent and, thereby, removed from the exhaust gas. Therefore, according to this method, the carbon particles collected by the DPF can be easily burned by  $\text{NO}_2$ , thereby being removed from the DPF without increasing the amount of NO released to the atmosphere."

Thus, there is no suggestion in Murachi, et. al. of forming nitrogen dioxide in the gas inflow passage so as to oxidize the particulate matter deposited on the porous flat plate to carbon dioxide and water as presently claimed. Therefore, there is no teaching or suggestion of how a filter having an oxidation catalyst in an inflow side with no oxidation catalyst in the outflow side of the flow path could achieve oxidizing nitrogen monoxide in the exhaust gas to nitrogen dioxide which oxidizes the particulate matter deposited on the porous flat plate to carbon dioxide and water using the filter of Murachi, et. al.

Accordingly, it is submitted that claim 8 along with claims 9-10, 12-13, and 20 dependent therefrom, distinguish over the references of record.

Claim 12 recites a filter *inter alia* a means for introducing exhaust gas into said exhaust gas in-flow passage of the filter and a means for interrupting the passage of the gas discharge from said out-flow passage are provided.

Such a filter is not shown nor disclose by Yajima in view of Hioki in further view of Murachi in further view of Gomyo.

There is no teaching or suggestion of a filter having a means for interrupting the passage of the gas discharge from the out-flow passage.

The Examiner concedes on page 8 of the Office action Yajima in view of Hioki, in further view of Murachi does not explicitly disclose a means for introducing exhaust gas into the in-flow passage and a means for interrupting the passage of gas discharged from the out-flow side, where the means for interrupting has a structure having a switching function of permitted or interrupting the passage of the gas.

Furthermore, for the reasons discussed above in claim 6, it is submitted that claim 12 along with claim 13 dependent therefrom, distinguish over the references of record.


### CONCLUSION


All formal and informal matters having been addressed, it is respectfully submitted that this application is in condition for allowance. If the Examiner is of the view that all of the pending claims of the application are not in clear condition for allowance, it is requested that the Examiner telephone the undersigned for purposes of conducting a telephone interview to resolve any differences. Accordingly, an early notice of allowance is earnestly solicited.

Respectfully submitted,

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